



ORIGINAL ARTICLE

The Effect of Consumption the Alcoholic Extract of Cedar on Blood Glucose, Urea and Total Cholesterol Diabetic Rats

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(Received: 19 June 2017

Accepted: 5 January 2021)

KEYWORDS

Diabetes;
Blood Glucose;
Urea;
Total Cholesterol;
Cedar

ABSTRACT: Diabetes is one of the common metabolic disorders whose complications have many health problems for society. This study has been carried out with the aim of investigating the effects of hydroalcoholic extract of cedar (*Ziziphus spina-christi*) on blood glucose, urea, and total cholesterol in the Wistar race of diabetic rats. Forty rats in the weighting range of 300 to 350 were selected as sample and were classified into four groups: control, control of cedar, diabetic, and diabetic of cedar and after bloodletting from rats, data were analyzed by SPSS23 software. Results showed that at the significance level of $P < 0.05$, consumption the hydroalcoholic extract of cedar leaf can be effective in reducing blood glucose, urea and total cholesterol. After four weeks with consumption of cedar, blood glucose in the diabetic group reduced from 214 mg.dl⁻¹ to 174 mg.dl⁻¹. After four weeks with consumption of cedar extract, blood urea in the diabetic group reduced from 9.4 mg.dl⁻¹ to 5.3 mg.dl⁻¹. After four weeks with consumption of cedar extract, the total cholesterol in the diabetic reduced from 66.3 mg.dl⁻¹ to 60.5 mg/dl. The results of this research indicate the effects of the cedar leaf extract on blood glucose, urea, and total cholesterol.

INTRODUCTION

Diabetes mellitus is one of the most common endocrine system diseases. According to the predictions, its prevalence in the human population will increase in the future [1]. Diabetes mellitus is a metabolic disease characterized by severe increase in the blood glucose and disorder in metabolism of carbohydrates, fats, and proteins [2]. Diabetes disease appears with long-term complications such as retinopathy, nephropathy, neuropathy, and cardiovascular diseases. It is estimated that more than 3.6 percent of the world's population are currently suffering from diabetes mellitus [3].

In the process of diabetes, hyperglycemia long periods may lead to the production of free radicals, especially ROS. This represents that a glucose oxidation and the glycosylated of proteins and unfavorable conditions in all tissues can disrupt the balance between ROS production and cell

defense mechanism. This imbalance leads to cell destruction, change in cell function, and damage to the tissues, in particular pancreatic [4]. There is currently great interest in the detection of antioxidant compounds with pharmacological potential without side effects or at least with minimal side effects very important in medicine and food industry [5]. Today, due to side effects and high costs of chemical drugs, the study of plants used in traditional medicine is a priority to achieve further progress in medical science [6]. Medicinal plants have the natural substances with lower possible side effects. Many of these plants are rich sources of natural antioxidants that may reduce the effects caused by oxidants or some diseases [7]. Cedar (*Ziziphus spina-christi*) is from Rhamnaceae family and evergreen plant with a height of 10 meters whose fruit is edible. Cedar is an evergreen plant with thorny branches

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DOI: 10.22034/jchr.2021.578239.0

and smooth and ovate leaves. Fruit of cedar plant is edible, fragrant, and in yellow or red color, with sweet flavor like jujube fruit and a diameter of about two centimeters. Being effective to prevent hair loss, cedar leaf powder has been used for washing hair and body. Moreover, the powder has been used for washing wounds [8]. This study has been carried out aiming at investigating the effect of hydroalcoholic extract of cedar on blood glucose, urea, and total cholesterol in the Wistar race of diabetic rats.

MATERIALS AND METHODS

In this study, 40 male rats of Wistar race in the weight range of 300 to 350g have been used. Animal freely accessed to piping water and particular food (Pars animal feed Co.) and mixed food with butanol extract of cedar for 4 weeks. For preparation of the hydroalcoholic extract of cedar, after drying in the shade, green and washed leaves of cedar were milled at ambient temperature and mixed with about 3g and 7 ml of 10% butanol and after wetting with the solvent, extracted for 72 hours by percolation method [9]. After passing through Wattman filter paper, the extract was spread out on the glass surface until the solvent was evaporate at ambient temperature [10]. In this study, for inducing type 1 diabetes, 40 rats were fasted for 12 hours

and Streptozotocin at a dose of 60 mg per kg of body weight was used. Streptozotocin powder in citrate 1% buffer solution with acidity 4.5% was solved and intraperitoneally injected to animals. Twelve hours after injection, blood glucose was measured. The animals with blood glucose of 250 mg per dl were considered diabetic. The blood level taken at each test was approximately one ml. Rats were randomly classified into four groups: control, control + cedar, diabetic, and diabetic + cedar [11]. The blood glucose was measured by glucose oxidase enzyme method in the fourth week using digital spectrophotometer and kits of Pars Co. were used for measuring blood glucose, total cholesterol, and blood urea. In the end, results were analyzed by SPSS software and ANOVA test at significance level of $P < 0.05$.

RESULTS

The results of this study concerning glucose revealed that compared to diabetic control group, consumption of hydroalcoholic extract of cedar significantly reduced blood glucose in the diabetic group at the significance level of $P < 0.05$. Therefore, blood glucose in the diabetic group reduced from $274 \text{ mg}\cdot\text{dl}^{-1}$ to $173.3 \text{ mg}\cdot\text{dl}^{-1}$ in diabetic group with consumption of cedar (Figure 1).

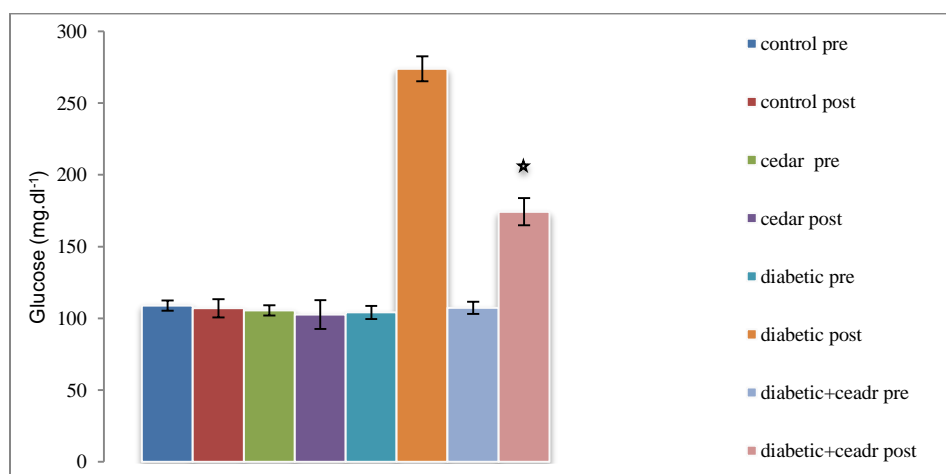


Figure 1. Mean and standard deviation of blood glucose per $\text{mg}\cdot\text{dl}^{-1}$ at the significance level of $P < 0.05$. Blood glucose in the diabetic group reduced from $274 \text{ mg}\cdot\text{dl}^{-1}$ to $173.3 \text{ mg}\cdot\text{dl}^{-1}$ in diabetic group with consumption the hydroalcoholic extract of cedar ($P < 0.05$).

The results of this study concerning blood urea revealed that compared to diabetic control group, consumption of hydroalcoholic extract of cedar significantly reduced blood

urea in the diabetic group at the significance level of $P < 0.05$. Therefore, blood urea in the diabetic group reduced from 9.4 mg.dl^{-1} to 5.3 mg.dl^{-1} in diabetic group with consumption of cedar (Figure 2).

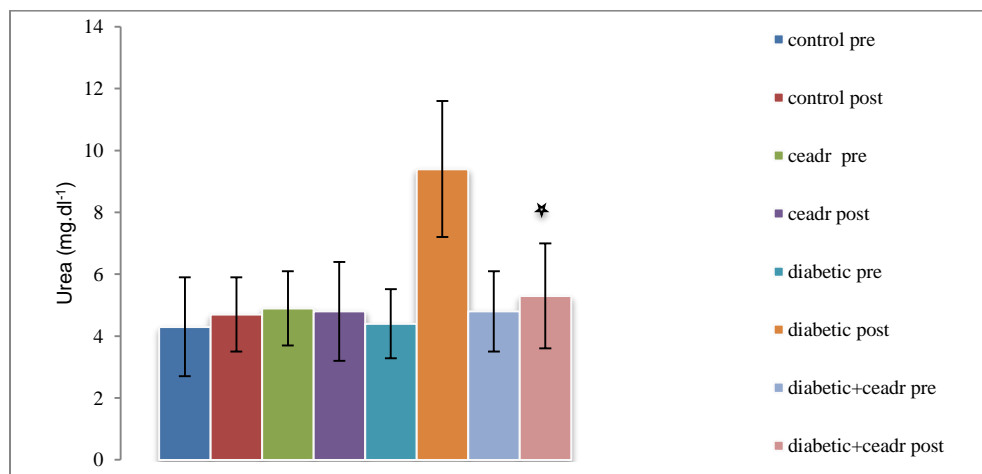


Figure 2. Mean and standard deviation of blood urea per mg.dl^{-1} at the significance level of $P < 0.05$. Blood urea in the diabetic group reduced from 9.4 mg.dl^{-1} to 5.3 mg.dl^{-1} in diabetic group with consumption the hydroalcoholic extract of cedar ($P < 0.05$).

The results of this study concerning blood total cholesterol revealed that compared to diabetic control group, consumption of hydroalcoholic extract of cedar significantly reduced total cholesterol in the diabetic group

at the significance level of $P < 0.05$. Therefore, the total cholesterol in the diabetic group is reduced from 66.3 mg.dl^{-1} to 60.5 mg.dl^{-1} in diabetic group with consumption of cedar (Figure 3).

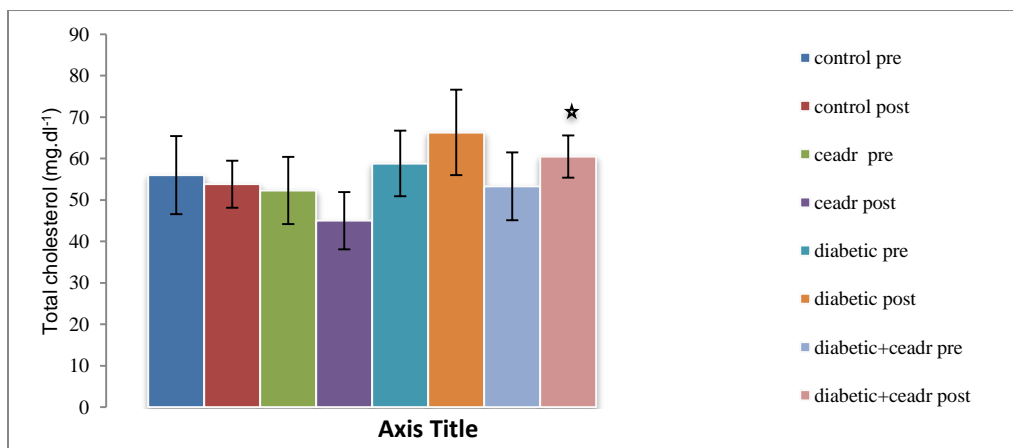


Figure 3. Mean and standard deviation of blood total cholesterol per mg.dl^{-1} at the significance level of $P < 0.05$. The blood total cholesterol in the diabetic group is reduced from 66.3 mg.dl^{-1} to 60.5 mg.dl^{-1} in diabetic group with consumption of cedar ($P < 0.05$).

DISCUSSION

This study has been carried out aiming at investigating the effect of hydroalcoholic extract of cedar on blood glucose, blood urea, and total cholesterol in diabetic rats. Findings of this study for blood glucose showed that the consumption of cedar leaf significantly reduced blood glucose in diabetic + cedar group compared to diabetic

group. Given that there are the powerful antioxidant compounds in cedar, such as Christine A, these compounds can be effective in reducing blood glucose. Ayatollahi et al. in a study on anti-diabetic properties of cedar extract showed that the cedar leaf can be effective in reducing blood glucose in diabetic rats at the significance level of

$P < 0.05$ [12], which is consistent with the findings of this research. In Egypt, Abdul Zaher et al. examined diabetic activity of butanol extract of cedar and Christine A on diabetic rats and observed that consumption of 100 mg of cedar extract and Christine A per kg of body weight can be effective in reducing blood glucose [13], showing that compared to the findings of this research, cedar extract and Christine A were significantly effective in reducing blood glucose.

The findings of the present research showed that at the significance level of $p < 0.05$, blood urea significantly reduced in the diabetic group+ cedar compared to the diabetic group. The effect of increasing blood urea in a diabetic person and relationship between diabetes and blood urea have been proved by Farokhi et al., so that their findings showed that increase in urea also increased blood glucose [14]. Hence, these findings are consistent with the results of this research. The findings of this research are consistent with the results of Mandid et al. that studied the effect of consumption the cedar leaf on blood glucose, urea, and creatinine in diabetic rats. The results showed that cedar is effective in reducing blood glucose and urea [15]. In Persian medicine, cedar (*Zizyphus spina-christi*) has medicinal properties like antibacterial activity and it is used topically for treatment of some kinds of skin problems. Previous research has shown that topical cedar solution had an evaluation the efficacy of acne vulgaris, indicating its effect on body fat [16]. Accordingly, the results of the present study showed that compared to diabetic group, total cholesterol at the significance level of $p < 0.05$ in the diabetic group + cedar significantly reduced, probably related to the presence of Eblin lacton and the compound effecting steroid hormones. The results of this study are consistent with findings of Zare et al. on the effect of hydroalcoholic extract of cedar plant on blood indices of kidney and liver function in diabetic male rats [17]. The results of the present research revealed that the mean glucose level of diabetic rats treated with alcoholic extract of cedar showed a significant decrease compared to diabetic rats not treated with it.

CONCLUSIONS

The use of medicinal plant in the treatment of disease can be effective. Diabetes is among the common diseases that has increased in recent decades. Diabetes do not have certain cure; but this disease can be controlled. The use of medicinal plants compared to chemical drugs can be more effective in the treatment of diabetes. The results of this study showed that hydroalcoholic extract of cedar has been effective in reducing blood glucose, blood urea, and total cholesterol. Thus, *Zizyphus spina-christi* leaves appear to be a safe alternative to lower blood glucose. According to the findings of this study, pharmaceutical companies can use the results for the treatment of diabetes.

ACKNOWLEDGEMENTS

In the end, we appreciate the research assistant of Islamic Azad University, Dehdasht Branch for his/her collaboration in this research.

Conflict of interests

The authors declare no conflict of interests.

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